

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Maurizio Grando et al. : Art Unit:  
Serial No.: To Be Assigned : Examiner:  
Filed: Herewith :  
For: FLAME ATMOSPHERE :  
ANALYZER AND A WATER- :  
HEATING DEVICE INCLUDING :  
THE ANALYZER (As Amended) :

**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231

SIR:

Before examining the application identified above, please amend that application as follows.

**IN THE TITLE:**

Please delete the present title in its entirety and substitute therefor:

FLAME ATMOSPHERE ANALYZER AND A WATER-  
HEATING DEVICE INCLUDING THE ANALYZER

**IN THE CLAIMS:**

Please replace claims 1-10 with the following amended claims and add claims 11-20 as follows:

- 1           1. (Amended) A flame atmosphere analyzer comprising:
- 2           a tube defining an air-gas intake and mixing chamber;
- 3           a gas-supply nozzle opening into the air-gas intake and mixing
- 4           chamber;
- 5           a flame burner comprising at least one flame jet which is in
- 6           flow communication with the air-gas intake and mixing chamber in order to
- 7           supply an air-gas mixture formed in the air-gas intake and mixing chamber to
- 8           the burner; and
- 9           a primary combustion air-supply means comprising at least one
- 10          duct which has a first end in flow communication with the air-gas intake and
- 11          mixing chamber and which is open at the opposite, second end in order to
- 12          take in the primary combustion air in a position remote and at a
- 13          predetermined distance from the air-gas intake and mixing chamber in the
- 14          tube.
- 1           2. (Amended) The analyzer according to Claim 1 in which
- 2          the duct is tubular.
- 1           3. (Amended) The analyzer according to Claim 1 further
- 2          comprising a flame-detection means connected to a circuit for controlling the
- 3          supply of gas to the gas-supply nozzle in order to interrupt the gas-flow to the
- 4          gas-supply nozzle when the level of oxygen in the primary combustion air
- 5          taken from the duct falls below a predetermined value bringing about
- 6          detachment of the flame from the burner and consequent intervention of the
- 7          flame-detection means.
- 1           4. (Amended) The analyzer according to Claim 3 in which
- 2          the flame-detection means comprises a thermocouple flame sensor.

1               5. (Amended) The analyzer according to Claim 4 in which  
2       the burner comprises at least two flame jets which diverge from one another  
3       and the side walls of which are substantially closed to the exterior except for  
4       an optional connecting duct between the flame jets for the lighting of one by  
5       the other, the thermocouple flame sensor being positioned relative to the jets  
6       in a manner such as to be struck by the flame of only one of them.

1               6. (Amended) A water-heating device comprising:

2               a flame atmosphere analyzer including:

3               (a) a tube defining an air-gas intake and mixing chamber,

4               (b) a gas-supply nozzle opening into the air-gas intake  
5       and mixing chamber,

6               (c) a flame burner comprising at least one flame jet  
7       which is in flow communication with the air-gas intake and mixing chamber  
8       in order to supply an air-gas mixture formed in the air-gas intake and mixing  
9       chamber to the burner, and

10              (d) a primary combustion air-supply means comprising at  
11       least one duct which has a first end in flow communication with the air-gas  
12       intake and mixing chamber and which is open at the opposite, second end in  
13       order to take in the primary combustion air in a position remote and at a  
14       predetermined distance from the air-gas intake and mixing chamber in the  
15       tube;

16                   a combustion chamber;

17                   a main burner disposed in the combustion chamber and piloted  
18 by the analyzer; and

19                   means for admitting air to the combustion chamber, including  
20 partition means for the air admitted to the combustion chamber, the duct  
21 extending into the combustion chamber from the tube of the analyzer so as to  
22 take in the primary combustion air in the vicinity of the main burner.

1                   7. (Amended) The device according to Claim 6 further  
2 comprising means for discharging the combustion fumes from a first portion  
3 of the combustion chamber and in which the partition means comprises at  
4 least one flame-arresting grid for containing the flame within the combustion  
5 chamber, the at least one grid being arranged in a second portion of the  
6 combustion chamber opposite the discharge means, and the duct for taking in  
7 primary combustion air opening in the second portion of the combustion  
8 chamber.

1                   8. (Amended) The device according to Claim 7 in which  
2 the duct opens in the combustion chamber in the vicinity of the flame-  
3 arresting grid in order to detect any changes in the oxygen level of the  
4 primary combustion air as a result of at least partial obstruction of the flame-  
5 arresting grid.

1                   9. (Amended) The device according to Claim 8, in which  
2 the duct comprises a first portion extending from the air-gas intake and  
3 mixing chamber in the tube and a second portion forming an extension of the  
4 first portion with a predetermined inclination to the first portion and opening  
5 at the opposite, free end of the duct.

1                   10. (Amended) The device according to Claim 9, further  
2 comprising a tank for the storage and heating of water for hygiene purposes.

1           11. (Newly Added) The device according to Claim 6, in  
2 which the duct comprises a first portion extending from the air-gas intake and  
3 mixing chamber in the tube and a second portion forming an extension of the  
4 first portion with a predetermined inclination to the first portion and opening  
5 at the opposite, free end of the duct.

1           12. (Newly Added) The device according to Claim 11,  
2 further comprising a tank for the storage and heating of water for hygiene  
3 purposes.

1           13. (Newly Added) The device according to Claim 6,  
2 further comprising a tank for the storage and heating of water for hygiene  
3 purposes.

1           14. (Newly Added) The device according to Claim 7, in  
2 which the duct comprises a first portion extending from the air-gas intake and  
3 mixing chamber in the tube and a second portion forming an extension of the  
4 first portion with a predetermined inclination to the first portion and opening  
5 at the opposite, free end of the duct.

1           15. (Newly Added) The device according to Claim 7,  
2 further comprising a tank for the storage and heating of water for hygiene  
3 purposes.

1           16. (Newly Added) The device according to Claim 8,  
2 further comprising a tank for the storage and heating of water for hygiene  
3 purposes.

1           17. (Newly Added) The analyzer according to Claim 2  
2 further comprising a flame-detection means connected to a circuit for  
3 controlling the supply of gas to the gas-supply nozzle in order to interrupt the  
4 gas-flow to the gas-supply nozzle when the level of oxygen in the primary  
5 combustion air taken from the duct falls below a predetermined value  
6 bringing about detachment of the flame from the burner and consequent  
7 intervention of the flame-detection means.

1               18. (Newly Added) The analyzer according to Claim 17 in  
2 which the flame-detection means comprises a thermocouple flame sensor.

1               19. (Newly Added) The analyzer according to Claim 18 in  
2 which the burner comprises at least two flame jets which diverge from one  
3 another and the side walls of which are substantially closed to the exterior  
4 except for an optional connecting duct between the flame jets for the lighting  
5 of one by the other, the thermocouple flame sensor being positioned relative  
6 to the jets in a manner such as to be struck by the flame of only one of them.

1               20. (Newly Added) A flame atmosphere analyzer  
2 comprising:

3               a tube defining an air-gas intake and mixing chamber;

4               a gas-supply nozzle opening into the air-gas intake and mixing  
5 chamber;

6               a flame burner comprising a first flame jet which is in flow  
7 communication with the air-gas intake and mixing chamber in order to supply  
8 an air-gas mixture formed in the air-gas intake and mixing chamber to the  
9 burner and a second flame jet, the two flame jets diverging from one another  
10 and the side walls of which are substantially closed to the exterior except for  
11 an optional connecting duct between the flame jets for the lighting of one by  
12 the other;

13              a primary combustion air-supply means comprising at least one  
14 tubular duct which has a first end in flow communication with the air-gas  
15 intake and mixing chamber and which is open at the opposite, second end in  
16 order to take in the primary combustion air in a position remote and at a  
17 predetermined distance from the air-gas intake and mixing chamber in the  
18 tube; and

19           a thermocouple flame sensor connected to a circuit for  
20 controlling the supply of gas to the gas-supply nozzle in order to interrupt the  
21 gas-flow to the gas-supply nozzle when the level of oxygen in the primary  
22 combustion air taken from the duct falls below a predetermined value  
23 bringing about detachment of the flame from the burner and consequent  
24 intervention of the thermocouple flame sensor, the thermocouple flame  
25 sensor being positioned relative to the jets in a manner such as to be struck  
26 by the flame of only one of them.

RECORDED IN U.S. PATENT AND TRADEMARK OFFICE

**REMARKS**

By this preliminary amendment, original claims 1-10 have been amended and new claims 11-20 have been added to place the application in better condition for examination and allowance. Entry of this preliminary amendment and issuance of a first action on the merits are requested.

Respectfully submitted,

RATNER & PRESTIA



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KRC/kak

Attachment: Version with Markings to Show Changes Made

Dated: February 8, 2002

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The Assistant Commissioner for Patents  
is hereby authorized to charge payment  
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Kathleen C. Hobby  
Kathleen C. Hobby

VERSION WITH MARKINGS TO SHOW CHANGES MADEIN THE TITLE:

[AN IMPROVED] FLAME ATMOSPHERE ANALYZER  
AND A WATER-HEATING DEVICE INCLUDING THE ANALYZER

IN THE CLAIMS:

Claims 11-20 have been added.

- 1        1. (Amended) A flame atmosphere analyzer comprising:  
2            [-] a tube defining [in which] an air-gas intake and mixing  
3        chamber [is defined,];  
4            [-] a gas-supply nozzle [and primary combustion-air supply  
5        means] opening into the air-gas intake and mixing chamber[,];  
6            [-] a flame burner comprising at least one flame jet which is in  
7        flow communication with the air-gas intake and mixing chamber in order to  
8        supply an air-gas mixture formed in the air-gas intake and mixing chamber to  
9        the burner[,]; and  
10            [characterized in that the] a primary combustion air-supply  
11        means [comprise] comprising at least one duct which has a first end in flow  
12        communication with the air-gas intake and mixing chamber and which is open  
13        at the opposite, second end in order to take in the primary combustion air in  
14        a position remote and at a predetermined distance from the air-gas intake and  
15        mixing chamber in the tube.  
1            2. (Amended) [An] The analyzer according to Claim 1 in  
2        which the duct is tubular.

1           3. (Amended) [An] The analyzer according to Claim 1 [or  
2 Claim 2,] further comprising a flame-detection means connected to a circuit  
3 for controlling the supply of gas to the gas-supply nozzle in order to interrupt  
4 the gas-flow to the gas-supply nozzle when the level of oxygen in the primary  
5 combustion air taken from the duct falls below a predetermined value  
6 bringing about detachment of the flame from the burner and consequent  
7 intervention of the flame-detection means.

1           4. (Amended) [An] The analyzer according to Claim 3 in  
2 which the flame-detection means comprisesa thermocouple flame sensor.

1           5. (Amended) [An] The analyzer according to Claim 4 in  
2 which the burner comprises at least two flame jets which diverge from one  
3 another and the side walls of which are substantially closed to the exterior  
4 except for an optional connecting duct between the flame jets for the lighting  
5 of one by [means of] the other, the thermocouple flame sensor being  
6 positioned relative to the jets in a manner such as to be struck by the flame of  
7 only one of them.

1           6. (Amended) A water-heating device [including a flame  
2 atmosphere analyzer according to one or more of the preceding claims and]  
3 comprising:

4           a flame atmosphere analyzer including:

5            (a) a tube defining an air-gas intake and mixing chamber,

6            (b) a gas-supply nozzle opening into the air-gas intake  
7 and mixing chamber,

8            (c) a flame burner comprising at least one flame jet  
9 which is in flow communication with the air-gas intake and mixing chamber  
10 in order to supply an air-gas mixture formed in the air-gas intake and mixing  
11 chamber to the burner, and

12                   (d) a primary combustion air-supply means comprising at  
13 least one duct which has a first end in flow communication with the air-gas  
14 intake and mixing chamber and which is open at the opposite, second end in  
15 order to take in the primary combustion air in a position remote and at a  
16 predetermined distance from the air-gas intake and mixing chamber in the  
17 tube;

18                   a combustion chamber;

19                   [-] a main burner disposed in [a] the combustion chamber and  
20 piloted by the analyzer[,], and

21                   [-] means for admitting air to the combustion chamber,  
22 including partition means for the air admitted to the combustion chamber,  
23 [characterized in that] the duct [is extended] extending into the combustion  
24 chamber from the tube of the analyzer so as to take in the primary  
25 combustion air in the vicinity of the main burner.

1                   7. (Amended) [A] The device according to Claim 6 further  
2 comprising means for discharging the combustion fumes from a first portion  
3 of the combustion chamber and in which the partition means comprises at  
4 least one flame-arresting grid for containing the flame within the combustion  
5 chamber, the at least one grid being arranged in a second portion of the  
6 combustion chamber opposite the discharge means [for the discharge of the  
7 combustion fumes], and the duct for taking in primary combustion air  
8 opening in the [said] second portion of the combustion chamber.

1                   8. (Amended) [A] The device according to Claim 7 in  
2 which the duct opens in the combustion chamber in the vicinity of the flame-  
3 arresting grid in order to detect any changes in the oxygen level of the  
4 primary combustion air as a result of at least partial obstruction of the flame-  
5 arresting grid.

1               9. (Amended) [A] The device according to [one or more of  
2 Claims 6 to] Claim 8, in which the duct comprises a first portion extending  
3 from the air-gas intake and mixing chamber in the tube and a second portion  
4 forming an extension of the first portion with a predetermined inclination to  
5 the first portion and opening at the opposite, free end of the duct.

1               10. (Amended) [A] The device according to [one or more of  
2 Claims 6 to] Claim 9, further comprising a tank for the storage and heating  
3 of water for hygiene purposes.

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